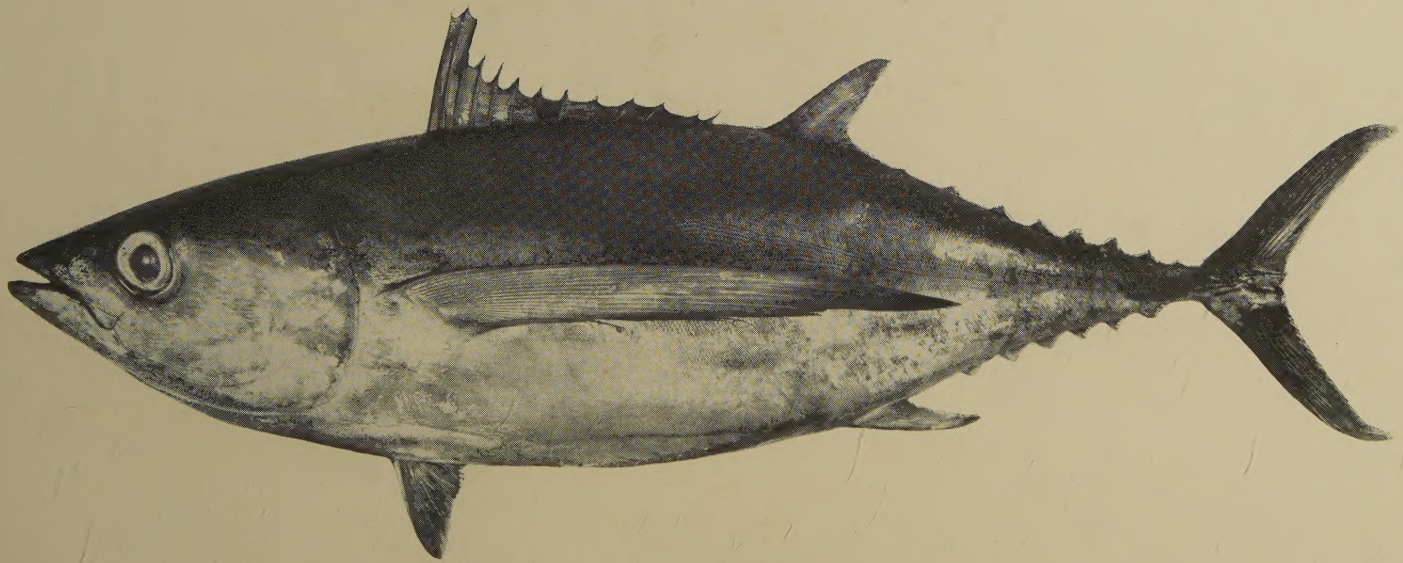

FIGURE 1. PACIFIC ALBACORE, *Thunnus germo* (Lacépède)

STATE OF CALIFORNIA
DEPARTMENT OF FISH AND GAME
MARINE FISHERIES BRANCH

FISH BULLETIN No. 100

Catch Localities for Pacific Albacore (*Thunnus germo*) Landed in California, 1951 through 1953

By
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MARINE FISHERIES BRANCH

1955

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INTRODUCTION[1]

Of prime importance to every fisherman, sport or commercial, is the question, "Where are the fish?" In the case of a wide-roaming fish like the albacore this question assumes real significance. Predictions as to where and when this prized tuna will appear can mean a great deal in dollars and cents to commercial fishermen, canners and sport boat operators, and in pleasure to the recreational fishermen.

In order to answer the question it is necessary to know the pattern of past catches. A knowledge of where and when albacore were caught in previous years will give an insight into the future.

The California albacore fishery is highly seasonal, being pursued only in the summer and fall. Catches are extremely variable from year to year. The more that is learned about this species, the better are chances for stabilization and expansion. When the albacore investigation was expanded in 1951, the gathering of data on commercial catch localities was intensified. Also under study are migrations, racial relationships, size at maturity, exploratory fishing methods, environment, and all the factors that bear upon a continued harvest at a high level.

This report describes the results of one of the lines of investigation into the life history of the albacore, a study being made with the objective of improving the fishery. Basic to any survey of this sort is an understanding of the location of the most productive fishing areas in both time and space. Summarized herein are the available data which delineate the fishing areas exploited by the California fleet.

THE ALBACORE FISHERY

Albacore occur along the Pacific Coast of North America from southern Baja California to Alaska between latitudes 25° and 59° north. From 1939 to 1945 considerable commercial quantities were taken off Oregon, Washington and British Columbia but since 1945 the majority of the fish have been caught in an area between Baja California and San Francisco within 400 miles of the coast (Figure 2).

The fishery comprises vessels of myriad sizes, shapes and descriptions using two types of gear, live bait and trolling. The smaller boats, usually under 30 feet in length, catch fish primarily on lures trolled astern near the surface of the water by lines of varying length. A trolling vessel (Figure 3) has a 20- to 30-foot eucalyptus pole rigged on each side. When fishing, the poles are lowered to a suitable height above the water. To each pole several trolling lines are attached with a steel or rubber spring in each to absorb the initial shock of a striking fish. The lines are graduated in length and so rigged that each can be pulled inboard without fouling the remaining lines.

The larger boats, usually over 30 feet in length (Figure 4), carry a bait tank piped for running sea water into which live bait, sardines or

[1] Submitted for publication April, 1955.

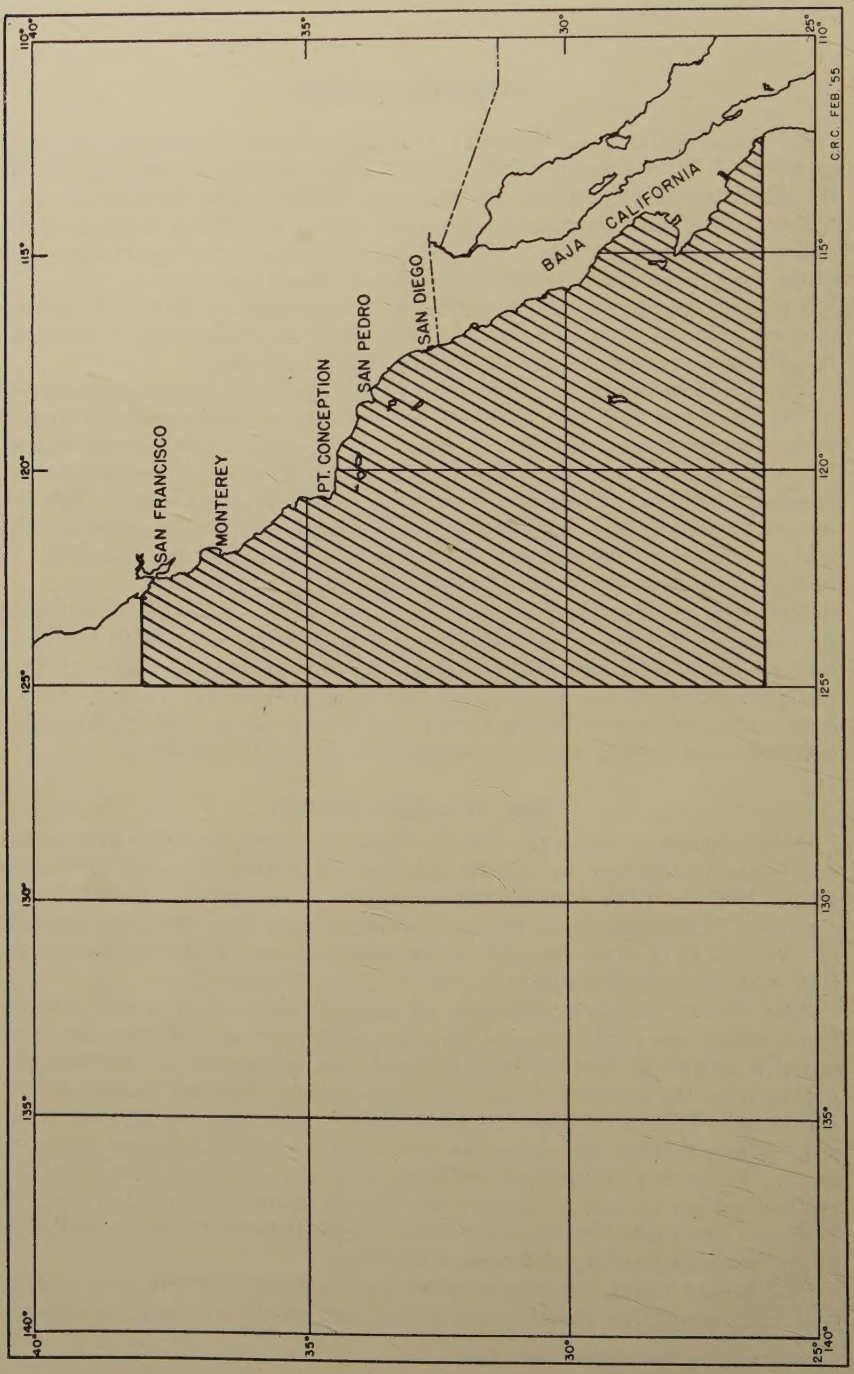


FIGURE 2. The most productive albacore fishing area on the west coast of North America since 1945

FIGURE 3. Albacore trolling vessels. Note trolling poles stowed in a vertical position. Photo by G. R. Chute, 1927.

anchovies, is loaded. Depending on economic factors, fishermen will either capture all of their own bait or will purchase it from live bait fishermen before departing and subsequently catch additional bait on the Baja California bait grounds. These vessels locate albacore schools primarily by trolling lures through the water. When a fish strikes, the vessel is immediately stopped and a steady stream of live bait chum is thrown overboard to attract the school. Meanwhile the trolling lines are secured and the fishermen start catching fish with live bait on hooks attached to hand lines or with artificial squids attached to conventional striker pole lines. As long as fishing is in progress live bait is continually tossed overboard to hold the school around the boat.

In exceptional years fish are caught from May through January. Typically, the fishery buds in June, develops very rapidly in July, is in full bloom by August and September, wanes during October and November and finally dies in December.

In general, since 1950, a small number of vessels commence scouting for albacore about the middle of June and usually succeed in catching a few fish from the early part of the run. By early July vessels operating from Los Angeles Harbor and San Diego have scouted the region fairly well from southern Baja California to Point Conception and have located areas where concentrations of fish occur. Vessels subsequently leaving port troll out to these known areas of fish. Meanwhile a number of vessels from Oregon and Washington, some of which have been fishing for salmon, start migrating southward to participate in the albacore fishery. These vessels scout for albacore on the way down.

By the latter part of July areas of abundance of albacore are being heavily fished. At this time the fishing fleet will be concentrated in a few relatively small localities. In the evenings when the vessels turn on their lights to drift on the fishing grounds an enchanting scene is created reminiscent of a large city at night, tempting the observer to step over the side of the boat and walk down the street. Among the boats in each fishing area there are always some more adventurous than

FIGURE 4. Albacore live-bait vessels. Note bait tank and trolling poles. Photo by G. R. Chute, 1927.

others. They leave the fleet and scout different localities hoping to improve their luck.

During August and September when the fishery is well developed the schools of albacore appear to be spread out over most of the southern fishing grounds and the fleet has resolved itself into smaller units to encompass these newly located concentrations of fish. These units maintain radio contact with each other and a frequent interchange of vessels between areas results. At all times there is a steady stream of loaded vessels departing from the fishing grounds and empty vessels returning to take their places. As the season progresses the southern areas become less productive and the bulk of this heterogeneous mass of incessantly moving, scouting, working, hoping, sweating fishermen moves northward up the coast. By November the fish are scattered over a large area with small sporadic catches being made from Baja California to San Francisco. In December the majority of the fish are caught north of Point Conception.

SOURCES OF INFORMATION

During the 1951, 1952, and 1953 seasons scientific personnel contacted albacore boats at their ports of landing and interviewed the fishermen to gather data concerning the catches. The vessel name, Fish and Game number, departure date, return date, and general area of each catch were recorded. The 1951 interviews were obtained at Los

Angeles Harbor, in 1952 at Los Angeles Harbor and San Diego and in 1953 at all the major ports of landing from San Diego to San Francisco.

When a load of fish is sold, the buyers are required by law to fill out a receipt in triplicate showing the date, vessel name, Fish and Game number plus exact pounds landed and to send the third copy to the Department of Fish and Game (see Fish Bulletin No. 86 for a detailed explanation of the statistical system). From these receipts a complete record of the pounds landed by each vessel after every trip is obtained. Information from interviews with the fishermen and from the fish receipts furnished the basis for this report.

METHODS USED

As a basis for summarizing albacore catch data the ocean was divided into geographical areas in such a manner as to fulfill the following requirements:

1. Simple, for ease in manipulating data.
2. Sufficiently small to bring out the important details of the fishery and still include enough data to give reliable figures.
3. Equal in size to permit comparisons between months and years.

The system that best fulfills these requirements divided the Eastern Pacific Ocean into five-degree squares. Each large square is designated by the latitude and longitude of its southeast corner and is further subdivided into 25 one-degree squares (Figure 5).

In 1951 from interviews with fishermen unloading at Los Angeles Harbor the location of catch was obtained. Since boats unloading at San Diego catch fish in essentially the same areas, the Los Angeles Harbor interviews were assumed to represent the catch localities for landings in both ports. During 1951, 74.6 percent of the albacore landed in the State was delivered to these two ports. In 1952 fishermen were interviewed both at Los Angeles Harbor and at San Diego. These two ports received 71.8 percent of the fish landed in the State. In 1953 interviews at all the major California ports from San Francisco to San Diego gave information about 99.2 percent of all fish landed. The interview samples taken at the ports of landing during any month were assumed to be representative of the activities of the fleet for that month and port. Using the interview cards representing specific fishing trips to determine the proportionate catch from each area and the statistical records, to determine the total pounds caught, the entire catch was assigned to the proper one-degree squares by month of catch.

Most of the vessels departed for the fishing areas and returned with their loads of fish during a single month. Some, however, departed during one month and returned the next. For these vessels the pounds caught each month was estimated by computing the catch per day's absence from port and multiplying this figure by the days absent during each month. Due to the nature of the fishery, this method tends to overestimate the pounds caught during the first month of a fishing season. To check the magnitude of this overestimate the data was subjected to a more detailed analysis. The results showed that for the seasons under study, vessels leaving port within the last four days of

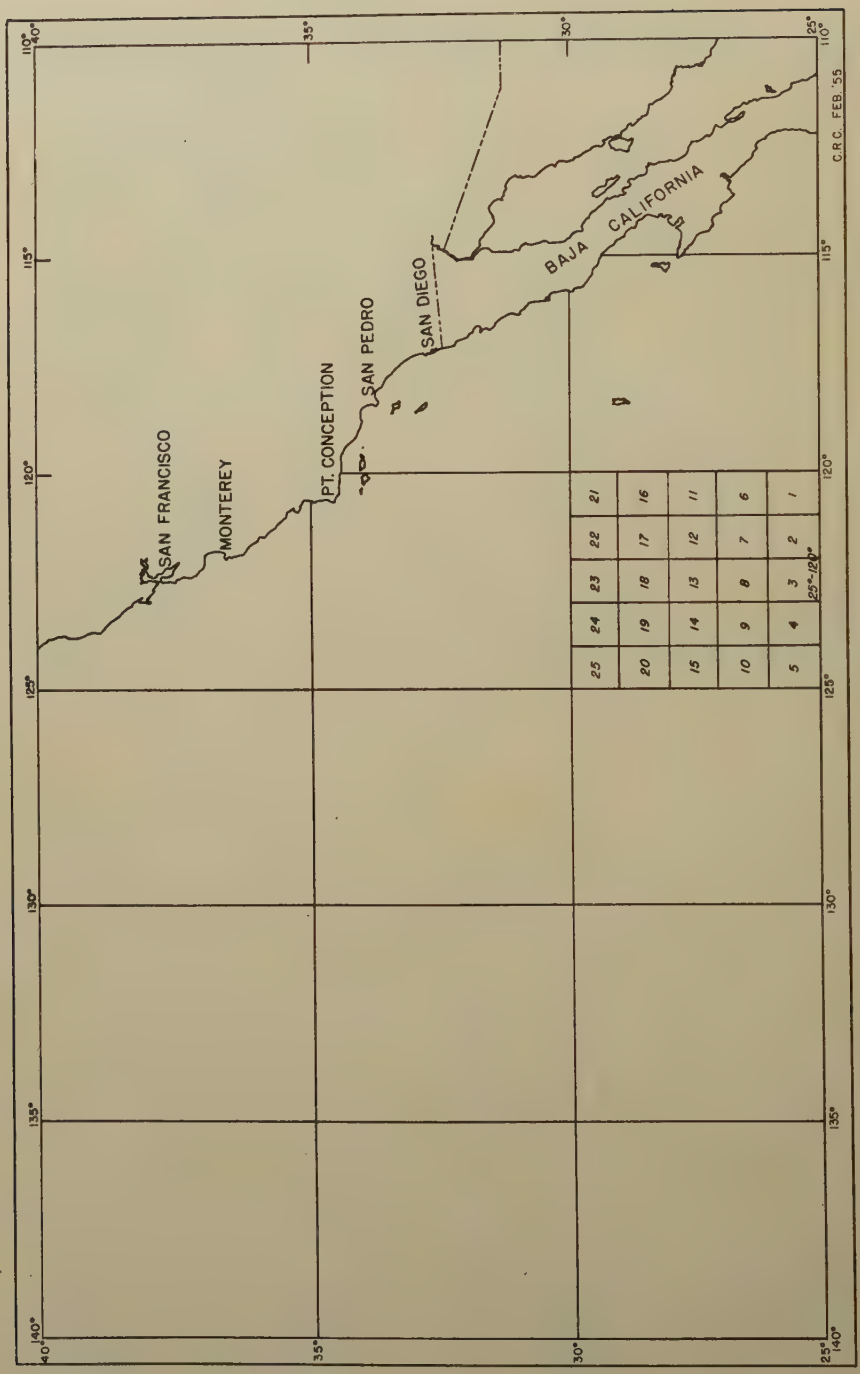


FIGURE 5. A section of the Eastern Pacific Ocean illustrating geographical areas. Each large five-degree square is designated by the latitude and longitude of its southeast corner and is further subdivided into 25 one-degree squares.

the first month of the fishery, in this case June, should be considered as catching all of their fish the following month, July. Application of this criterion to the data revealed that the June, 1951, landings were overestimated by 5.5 tons, June, 1952, landings by 82 tons and June, 1953, landings by five tons. Only the overestimate for June, 1952, was considered important and the original calculations were corrected for this error.

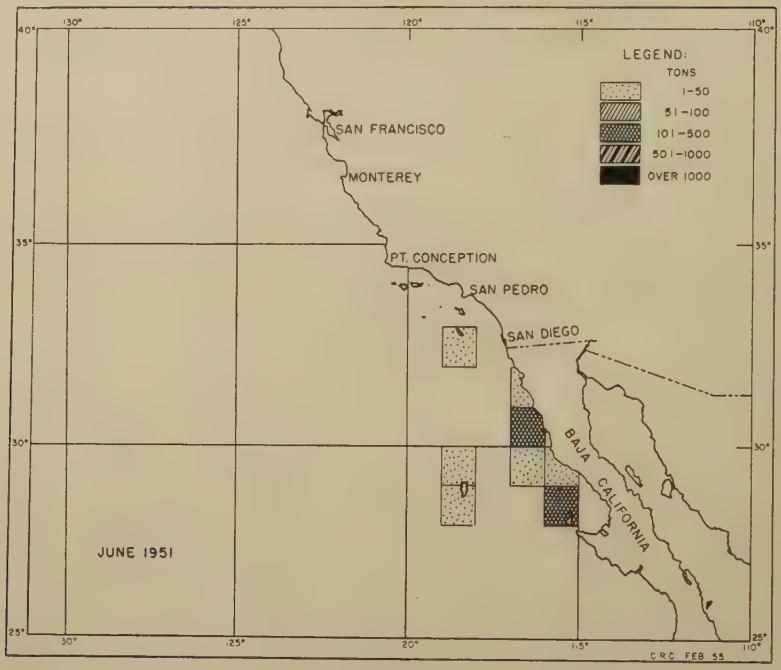
As a means of estimating the adequacy of the random interview samples, Table 1 has been included to indicate the tons of fish caught by the fishing fleet, tons represented by the interviews and percent of total catch interviewed for each month.

TABLE 1

Assigned Month	*Fleet catch tons*	*Interview tons*	*Interview percent of catch*
1951			
June	607	48	7.9
July	5,123	588	11.5
August	4,722	799	16.5
September	881	113	12.8
October	102	6	5.8
November	96	6	6.2
December	--	--	--
Total	11,531	1,560	13.5
1952			
June	592	114	19.3
July	6,503	1,256	19.3
August	7,621	1,466	19.2
September	1,313	284	21.6
October	1,421	23	1.6
November	431	77	17.9
December	1	1	100.0
Total	17,882	3,220	18.0
1953			
June	433	24	5.6
July	5,113	332	6.5
August	6,847	716	10.5
September	3,628	602	16.6
October	750	37	4.9
November	7	1	14.3
December	--	--	--
Total	16,778	1,712	10.2

RESULTS

For the 1951 albacore season 74.6 percent of the total pounds landed in California by the fishing fleet was assigned to one-degree squares by month of catch (Figures 6-11). For the 1952 season 71.8 percent of the landings in California was assigned to one-degree squares by month of catch (Figures 12-17). For 1953, 99.2 percent of the landings was assigned (Figures 18-23). Detailed tonnages by squares are given in the appendix.



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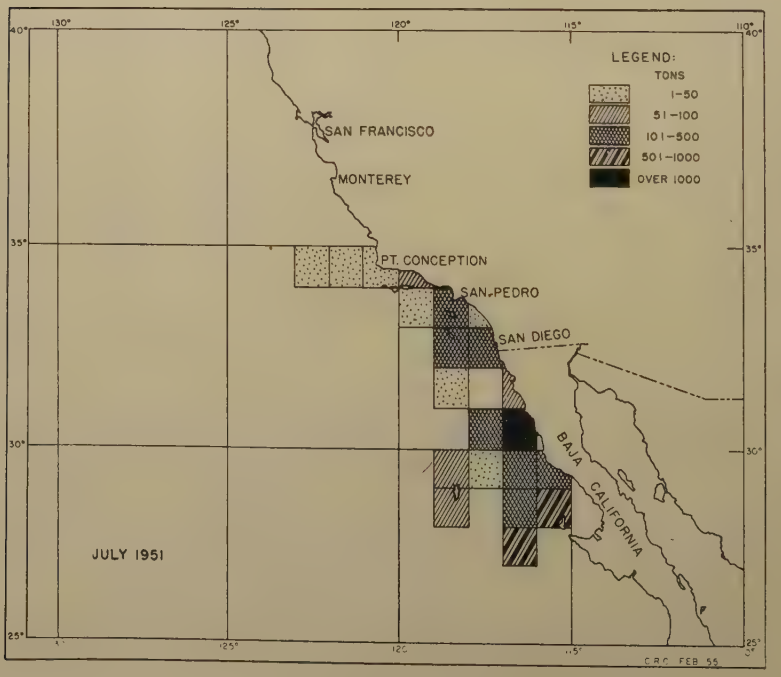

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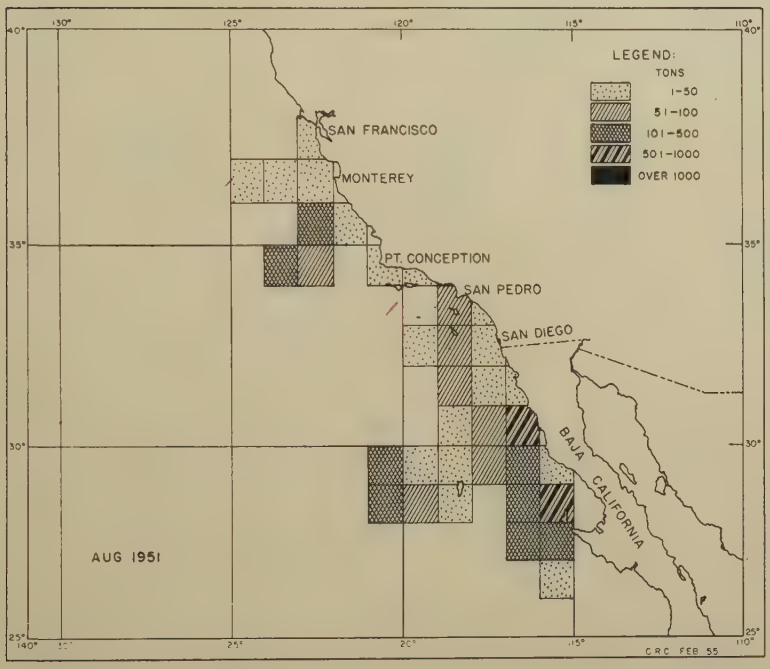

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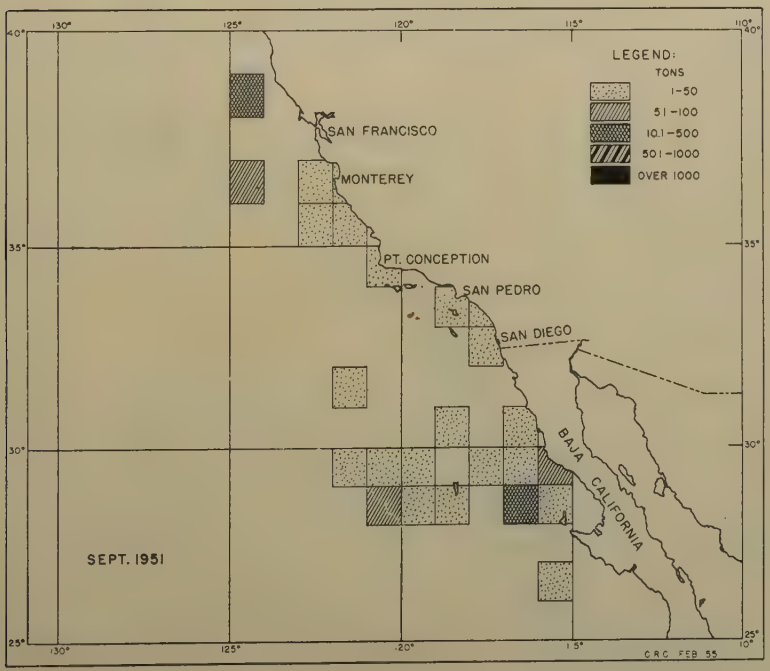

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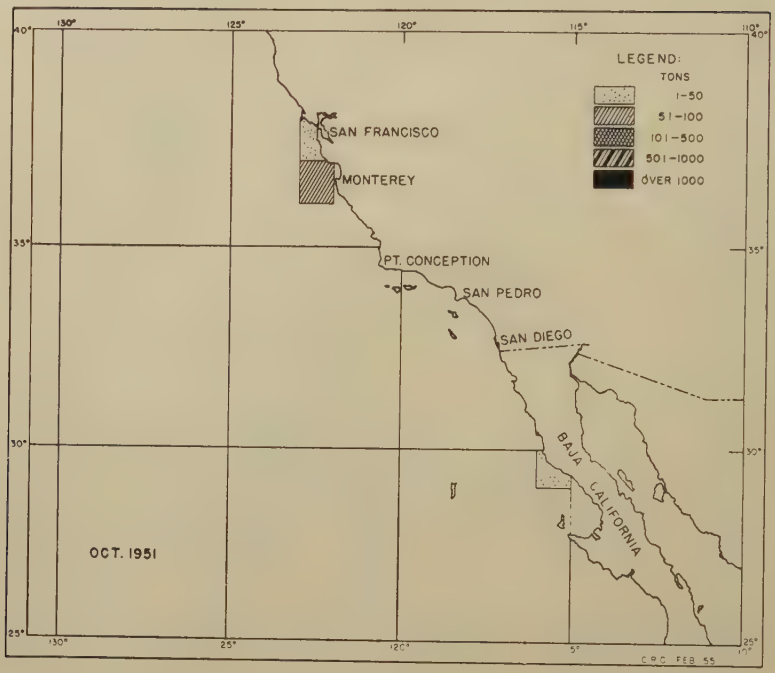

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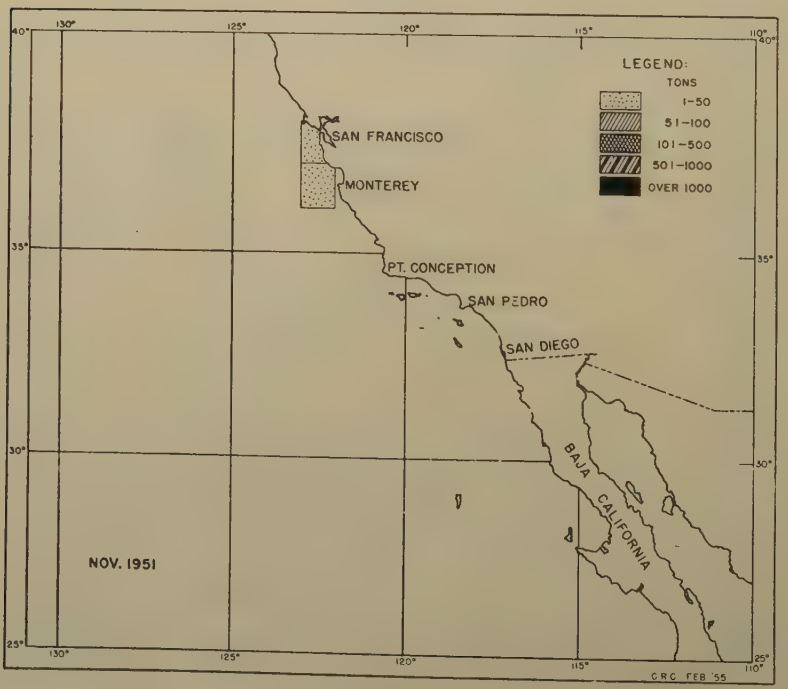

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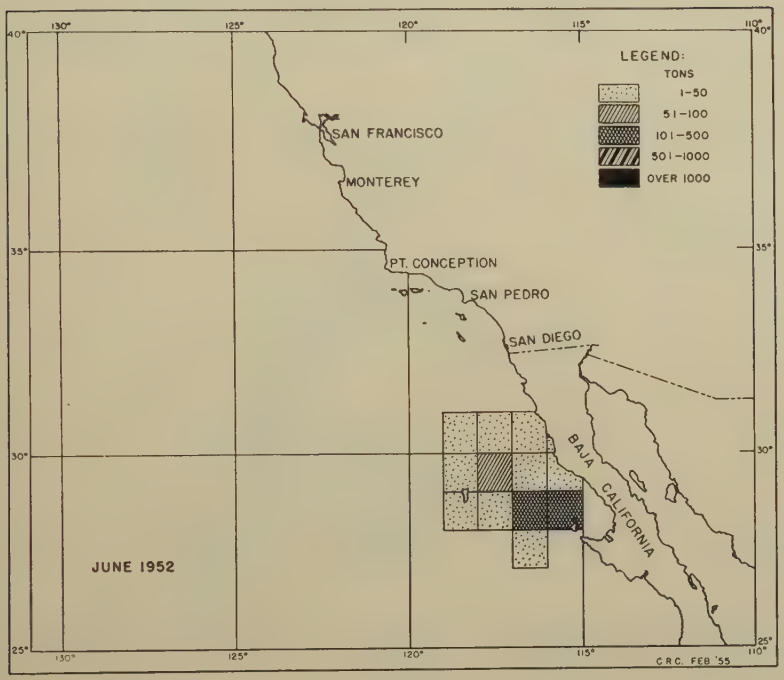

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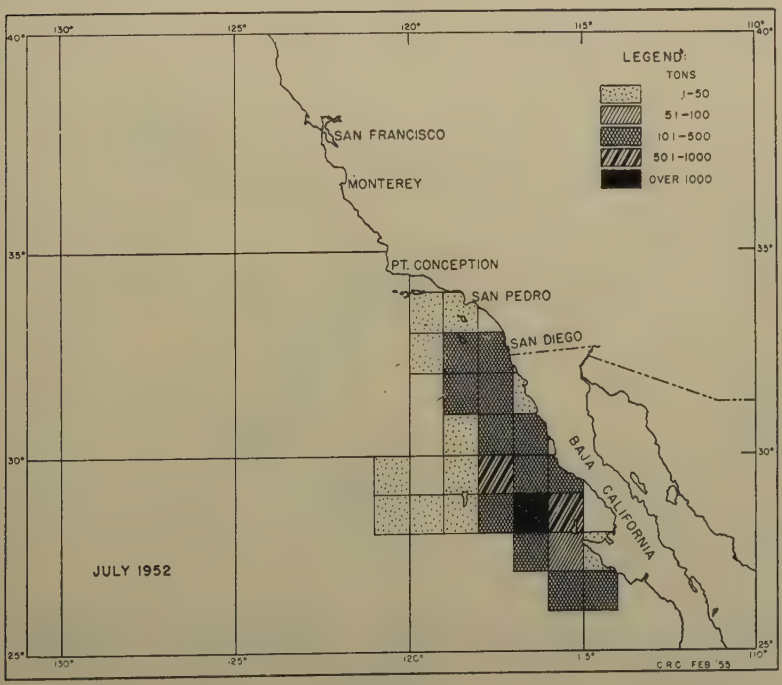

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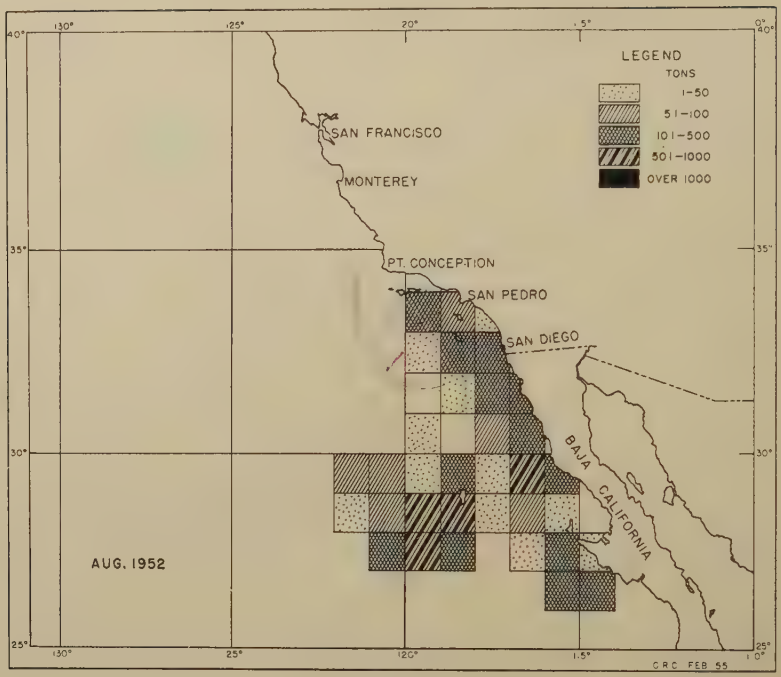

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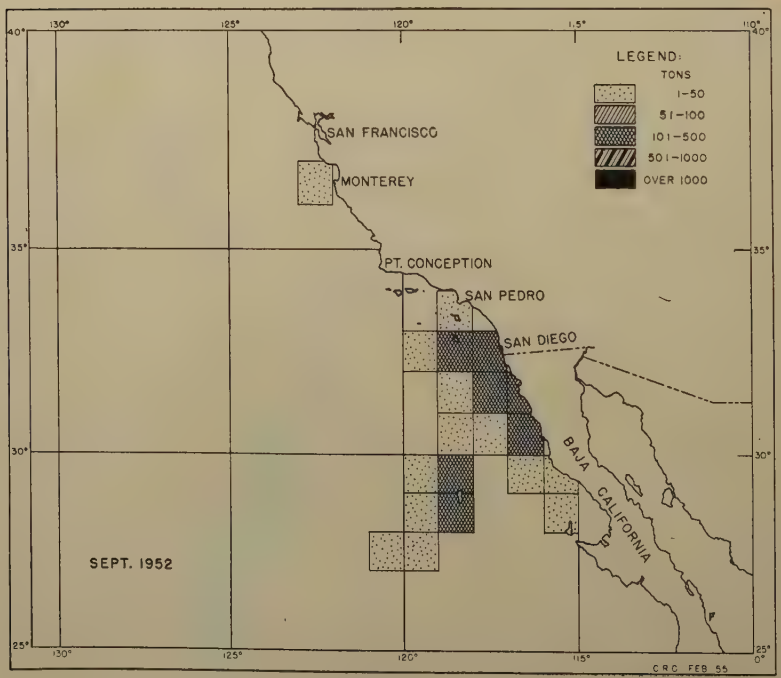

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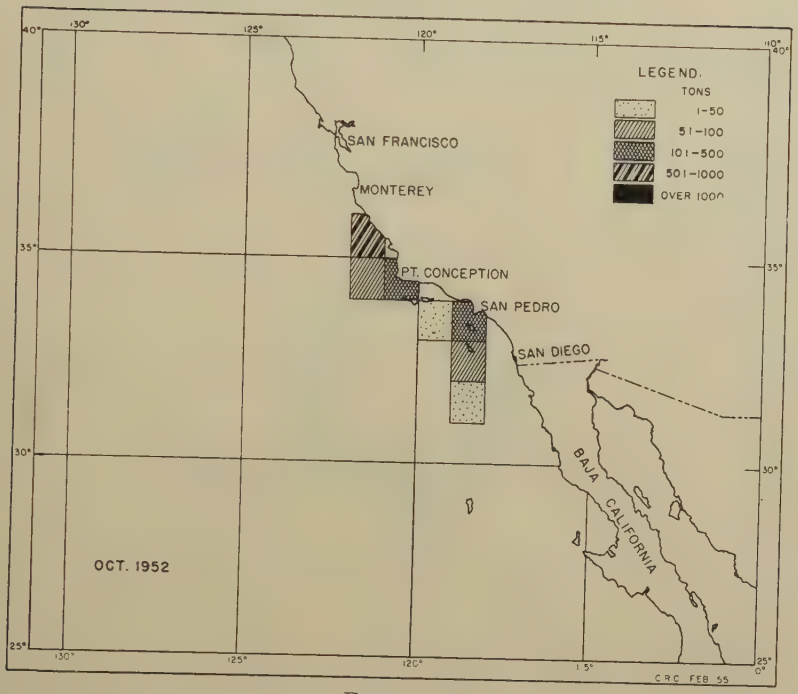

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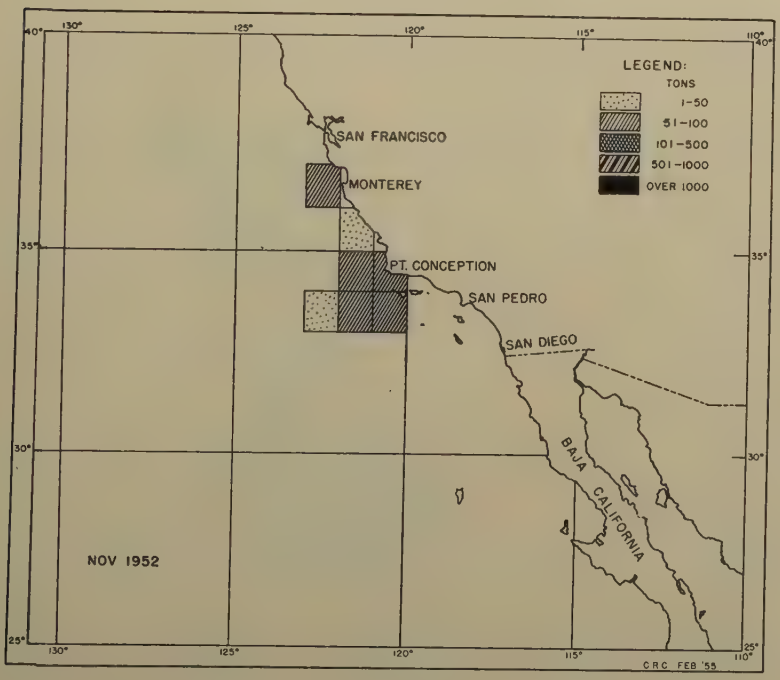

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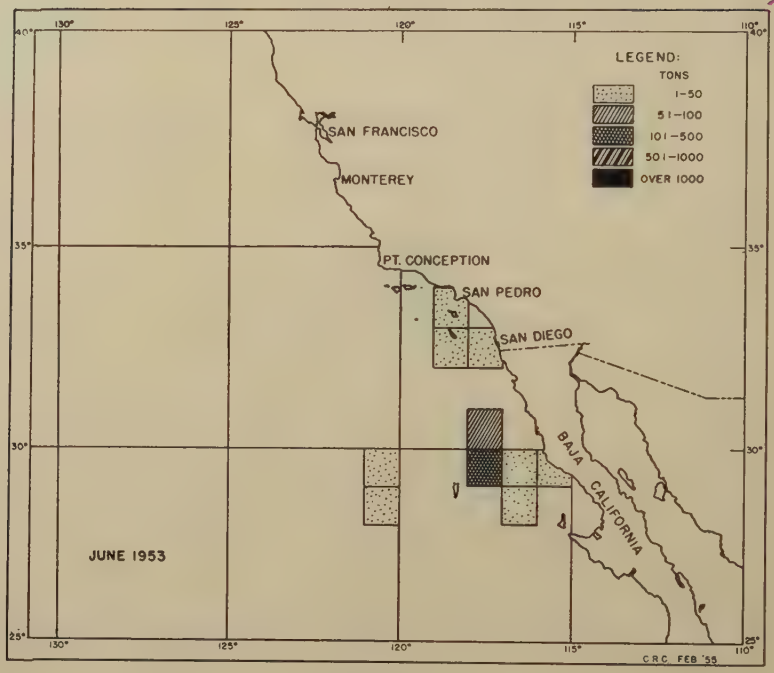

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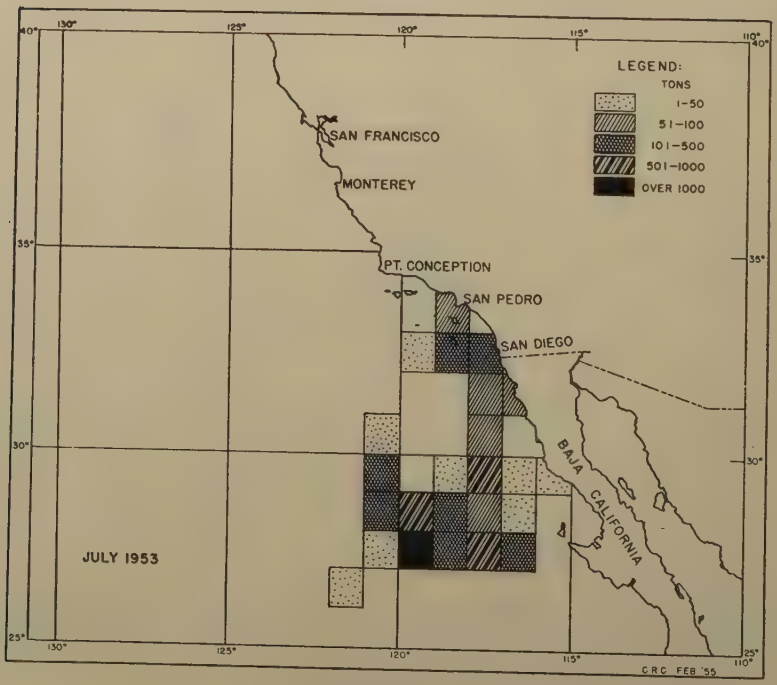

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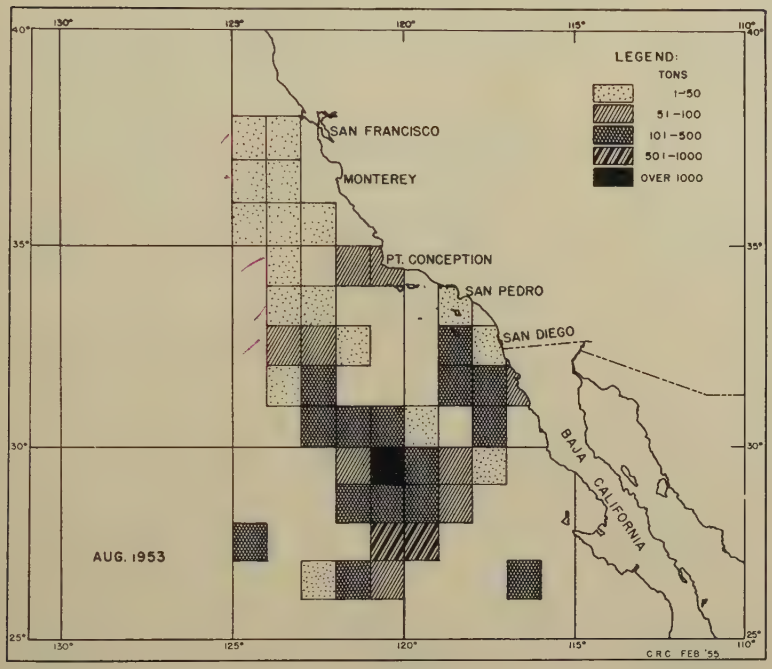

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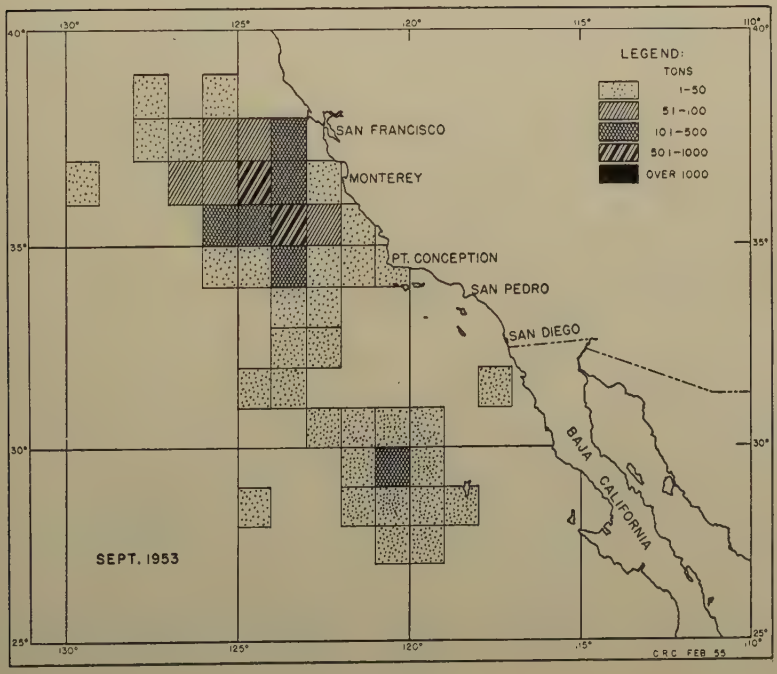

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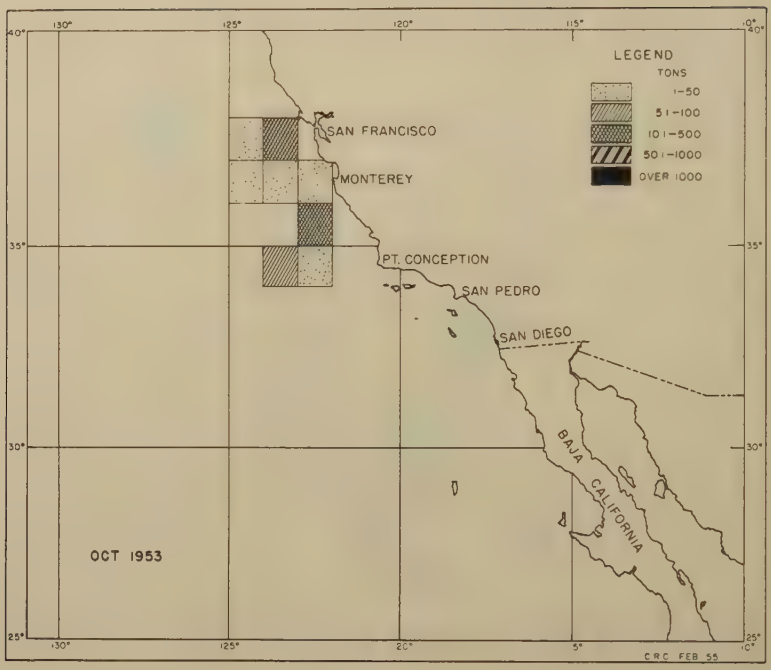

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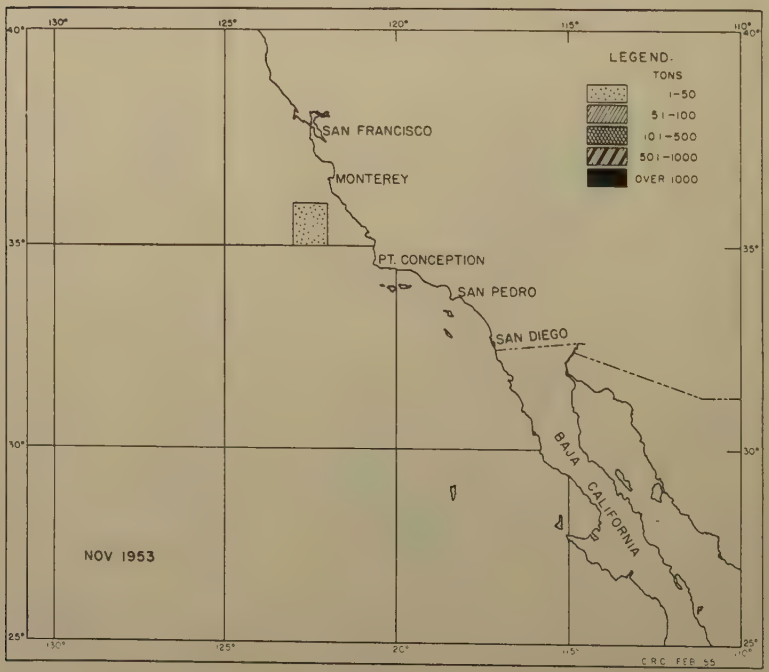

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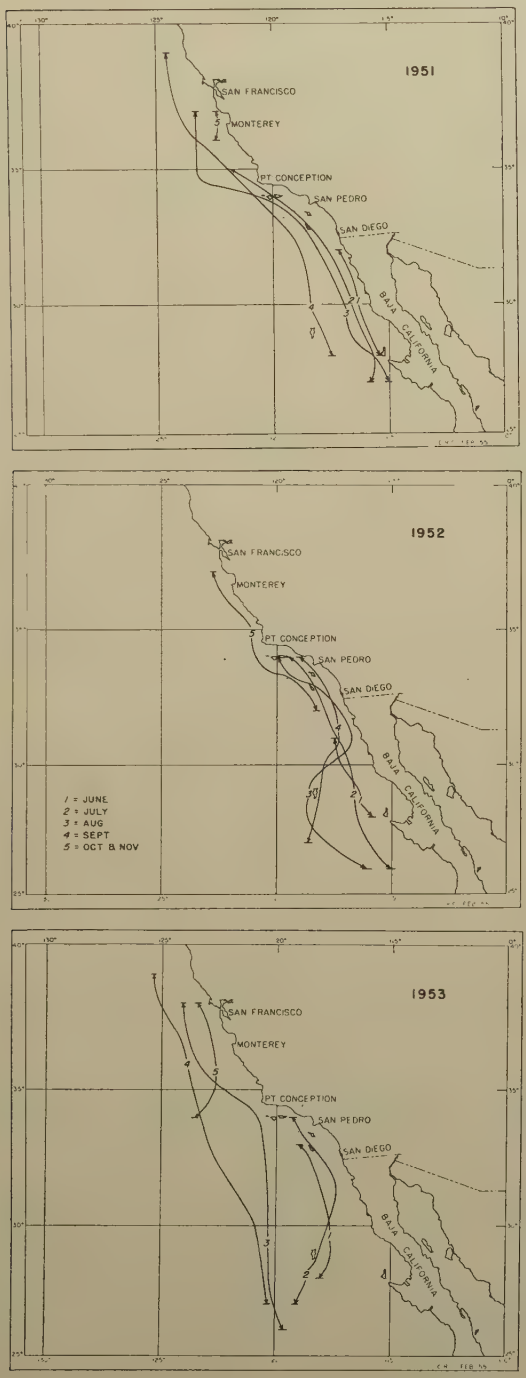

FIGURE 24. Three-year trend of the California albacore fishery. The geographical location of each number designates the central point of the albacore catch for each month. Each line extends over the total area fished during the month and describes diagrammatically the northward expansion of the fishery as the season progresses.

CONCLUSIONS

The vast majority of albacore landed in California since 1950 was caught during July, August, and September between latitude 26° north and latitude 36° north from the coast out to longitude 125° west.

During June and July, 1951, most of the fish were captured relatively near shore; within 150 miles. In August and September the offshore area (outside 150 miles) increased markedly in importance. In October and November small catches were made north of Point Conception in the Monterey-San Francisco area.

The inshore area was again the most productive during June and July, 1952, but an offshore trend had developed in July. By August this area had become almost as important as the inshore area. From September on, however, the inshore area was once again dominant.

During June, 1953, the inshore area was the most important, but the offshore trend had already become apparent. By July this offshore trend was very important while the inshore area was less productive. In August and September the offshore area was the most productive except for the heavy catches made in two localities north of Point Conception during September.

Each year as the season progresses the fishery tends to move northward up the coast and offshore (Figure 24). By November most of the fish are taken north of Los Angeles Harbor.

Since 1950 the fishery has gradually shifted offshore. This trend started in August, 1951, and by August, 1953, the offshore area was the most productive.

ACKNOWLEDGMENTS

Numerous individuals have contributed to the preparation of this report. The albacore fishermen supplied basic information on catch localities. The statistics staff contributed vital information on albacore landings. The tuna staff assisted in collecting all field data. Mr. Charles Clothier drew the charts. To these people I extend hearty thanks and appreciation.

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APPENDIX

TABLE A

Tons of Albacore Caught in 1951 by One Degree Block Areas by Month

Block area	June	July	Aug.	Sept.	Oct.	Nov.	Total
25-115- 6			4	12			16
-11			205				205
-12		574	478				1,052
-16	209	913	670	36			1,828
-17		180	176	158			514
-19	10	88	27	12			137
-20			93	6			99
-21	13	160	30	99	31		333
-22	47	279	389	44			759
-23		50	71	2			123
-24	10	88	27				125
-25			18	6			24
Total	289	2,332	2,188	375	31		5,215
25-120-16			270	76			346
-21			270	5			275
-22				31			31
Total			540	112			652
30-115- 2	263	1,623	645	2			2,533
- 3		112	80				192
- 4			12	34			46
- 7	7	56	23				86
- 8			45				45
- 9		4	79				83
-13		124	31	47			202
-14	48	443	63				554
-15			30				30
-18		1	26	14			41
-19		298	69	20			387
-20		9					9
-25		81	3				84
Total	318	2,751	1,106	117			4,292
30-120- 7				13			13
-21		9	1	1			11
-22		12					12
-23		19	88				107
-24			373				373
Total		40	462	14			516
35-120- 2			1	5			6
- 3			374	50			424
- 7				4			4
- 8			1	31	58	48	138
- 9			35				35
-10			8	60			68
-13			7		13	48	68
-20				113			113
Total			426	263	71	96	856
Grand total	607	5,123	4,722	881	102	96	11,531

TABLE B

Tons of Albacore Caught in 1952 by One Degree Block Areas by Month

Block area	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
25–110–10		224	234					458
–15		13	16					29
Total		237	250					487
25–115– 6		303	192					495
–11		99	126					225
–12	46	218	34					298
–14			317					317
–15			971	12				983
–16	172	947	44	1				1,164
–17	168	1,565	58					1,791
–18	28	334	33					395
–19	7	5	958	114				1,084
–20		25	768	23				816
–21	5	199	171	6				381
–22	5	423	539	6				973
–23	76	623	48					747
–24	7	21	391	111				530
–25			38	7				45
Total	514	4,762	4,688	280				10,244
25–120–11			337	11				348
–16		7	98					105
–17			39					39
–21		7	58					65
–22			64					64
Total		14	596	11				621
30–115– 1	16							16
– 2	37	208	252	123				620
– 3	20	180	78	11				289
– 4	5	42		2				49
– 5			15					15
– 7		50	310	277				637
– 8		466	260	302				1,028
– 9		118	25	35	21			199
–13		151	165	121				437
–14		251	411	104	65			831
–15		6	42	20				68
–18			3					3
–19		14	75	6	106			201
–20		4	451		41			496
Total	78	1,490	2,087	1,001	233			4,889
30–120–16						55		55
–17						54	1	55
–18						12		12
–21					408	91		499
–22					76	75		151
Total					484	287	1	772
35–20– 2					704	44		748
– 8				21		100		121
Total				21	704	144		869
Grand total	592	6,503	7,621	1,313	1,421	431	1	17,882

TABLE C

Tons of Albacore Caught in 1953 by One Degree Block Areas by Month

Block area	June	July	Aug.	Sept.	Oct.	Nov.	Total
25–115– 7			113				113
–12		162					162
–13		919					919
–14		160					160
–15		1,004	547	14			1,565
–17	9	6					15
–18		77					77
–19		127	62	9			198
–20		649	441	22			1,112
–21	15	3					18
–22	24	9					33
–23	186	659	42				887
–24		38	64				102
–25			397	23			420
Total	234	3,813	1,666	68			5,781
25–120– 6			71				71
– 7		44	102				146
– 8			45				45
–11		39	764	21			824
–15			117				117
–16	43	192	379	31			645
–17			304	46			350
–20				18			18
–21	43	192	1,117	122			1,474
–22			87	3			90
Total	86	467	2,986	241			3,780
30–115– 3	70	66	200				336
– 5			49	19			68
– 7		67	69				136
– 8		69	286	15			370
– 9			113				113
–13	3	110	3				116
–14	20	406	156				582
–15		46					46
–19	20	68	3				91
Total	113	832	879	34			1,858
30–120– 1		1	279	5			285
– 2			273	22			295
– 3			115	3			118
– 8			106				106
– 9			41	16			57
–10				16			16
–12			43				43
–13			63	16			79
–14			69	10			79
–18			6	26			32
–19			42	36			78
–21			74	12			86
–22			69	22			91
–23				38	29		67
–24			20	218	55		293
–25				35			35
Total		1	1,200	475	84		1,760
30–125–21				33			33
Total				33			33

TABLE C—Continued

Tons of Albacore Caught in 1953 by One Degree Block Areas by Month

Block area	June	July	Aug.	Sept.	Oct.	Nov.	Total
35–120– 2				6			6
– 3			36	79	449	7	571
– 4			26	535			561
– 5			4	440			444
– 8				3	25		28
– 9			29	431	28		488
–10			9	711	21		741
14			6	106	122		234
15			6	74	21		101
Total			116	2,385	666	7	3,174
35–125– 1				125			125
– 6				54			54
– 7				62			62
–10				13			13
–11				88			88
–12				19			19
–13				15			15
–16				13			13
–18				3			3
Total				392			392
Grand total	433	5,113	6,847	3,628	750	7	16,778

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